

(12) **UK Patent Application** (19) **GB** (11) **2 205 526** (13) **A**  
(43) Application published 14 Dec 1988

(21) Application No 8809426

(22) Date of filing 21 Apr 1988

(30) Priority data

(31) 3713976 (32) 25 Apr 1987 (33) DE

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**B32B 7/12 27/08**

(52) Domestic classification (Edition J):

**BSN 0712 2708 2732**

(56) Documents cited

**None**

(58) Field of search

**BSN**

**Selected US specifications from IPC sub-class  
B32B**

(54) **Adhesive laminate having a brittle cover layer**

(57) Method of manufacturing of a multilayer plastic film which has a backing layer an adhesive layer, and a cover layer, which by means of a tool or object inducing pressure exposes the adhesive arranged underneath the cover layer. The three layers, i.e., backing, adhesive and cover layer are coextruded in one step, wherein the layers have preferably the following thicknesses:

backing                      from 20 microns to 100 microns,  
adhesive                    from 10 microns to 100 microns,  
plastic cover layer        from 2 microns to 20 microns.

The cover layer consists of a brittle extrudable thermoplast, preferably a brittle-hardening polyethylene or polystyrene.

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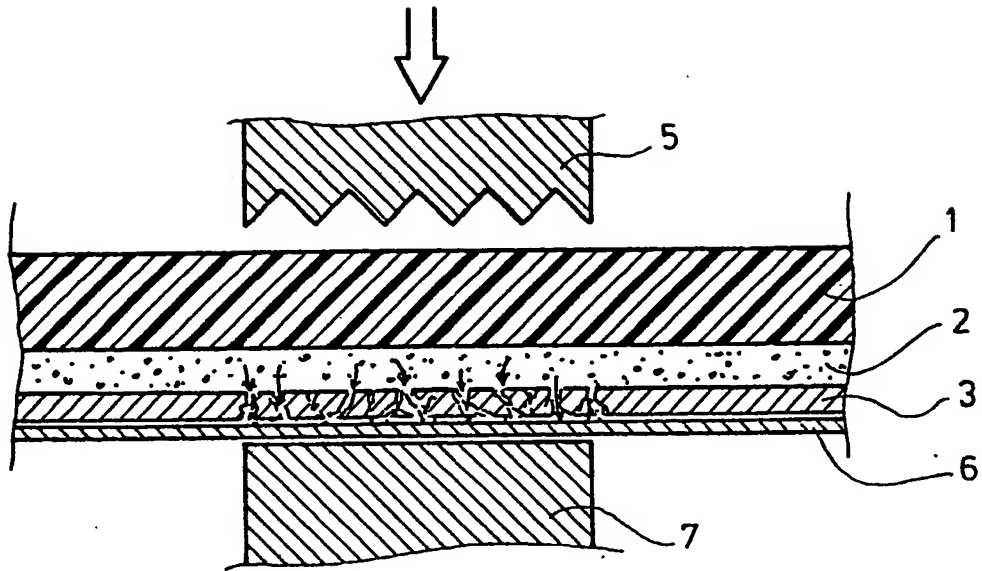


Fig.1

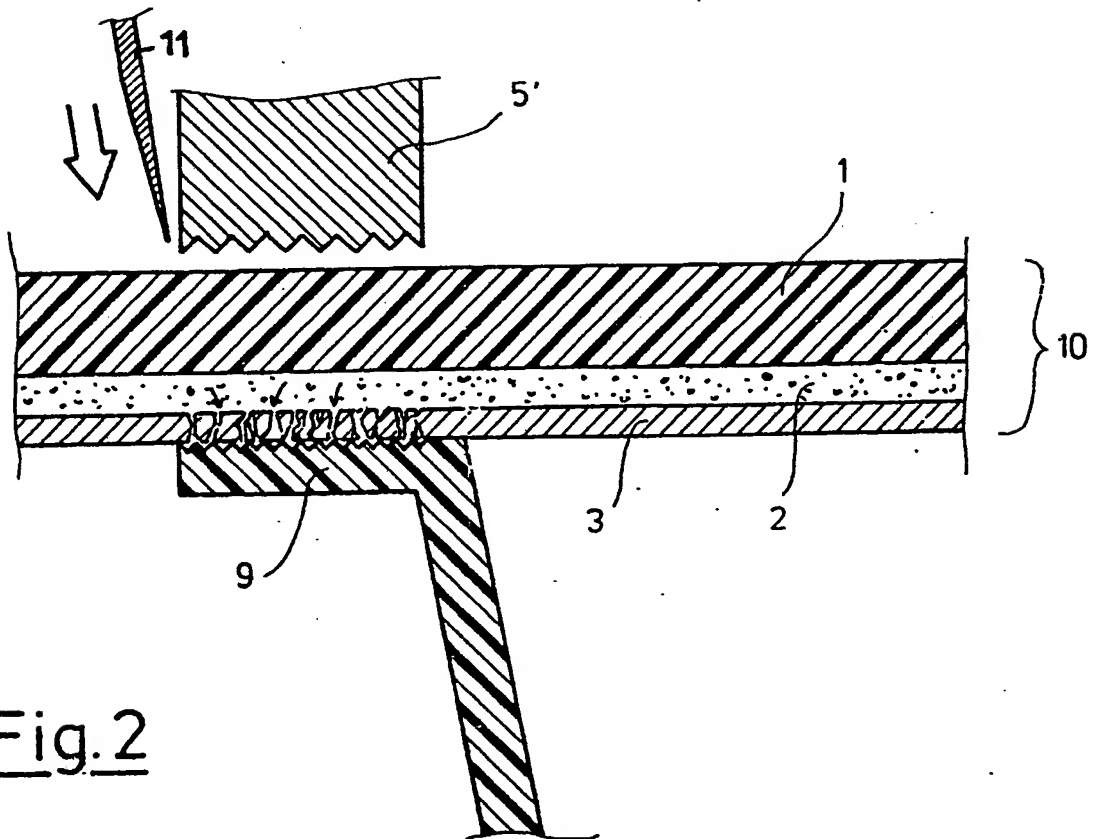
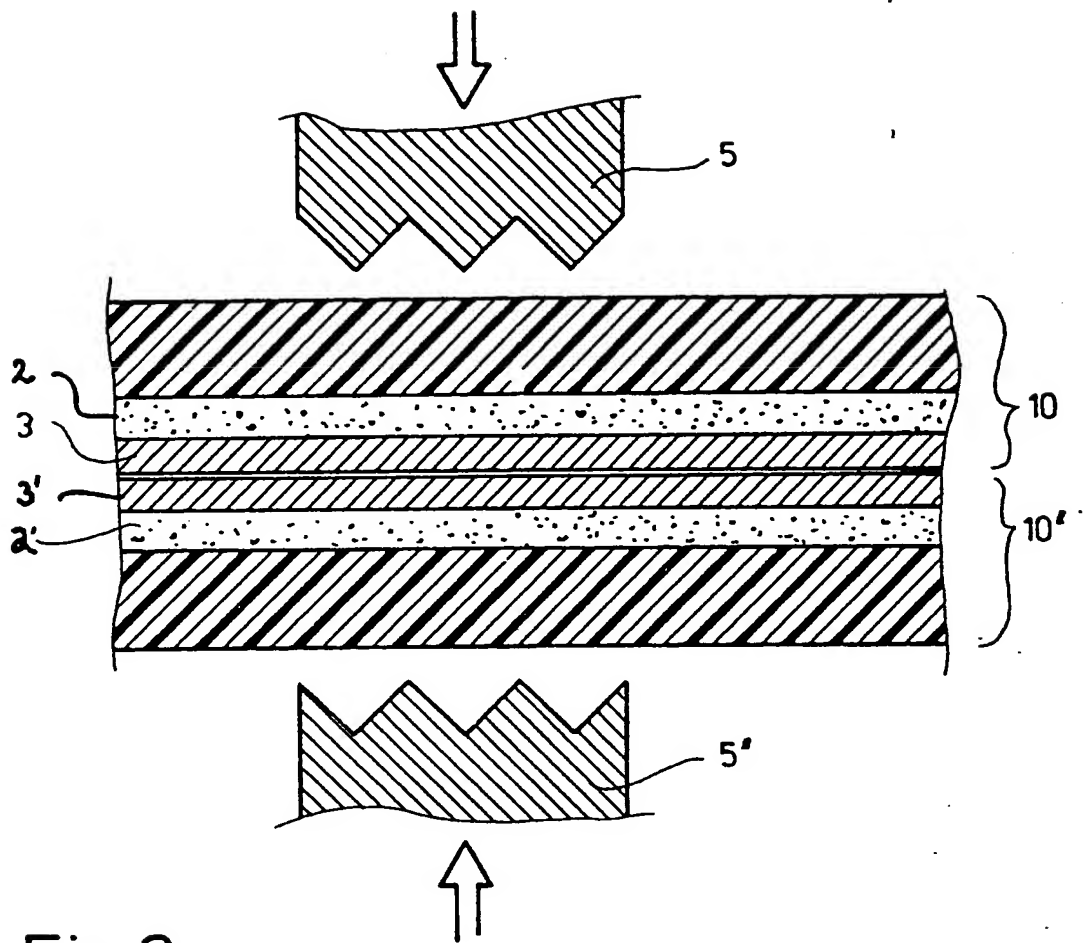


Fig.2

Fig.3

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10      Method of manufacturing of a multilayer plastic film with  
an adhesive coating

15      The invention relates to a method of manufacturing of a  
multilayer plastic film which has a backing and a coating  
applied thereto consisting of adhesive, which coating is  
externally coated with a cover layer which by means of a  
tool or object inducing pressure exposes the adhesive  
arranged underneath the cover layer.

20      German published application (DE-OS) 31 27 205 describes  
a plastic film which is coated on one side with a pres-  
sure sensitive adhesive layer. Said adhesive layer is  
coated with a protective layer which has the property  
that the adhesive penetrates the protective layer by  
25      inducing pressure on said protective layer. During in-  
duction of pressure the protective layer shall be de-  
stroyed or pressed aside where the higher pressure is  
effective. Thereby the pressure sensitive adhesive is  
exposed. A low molecular polyethylene (e. g., paraffine),  
30      wax or a lacquer consisting of vinylpolymerisates, poly-  
urethane, acrylate or polystyrene is proposed for the  
protective layer. The application thickness of the layer  
should be 0,5 - 50 g/m<sup>2</sup>. Referring to a density of 1 this  
results in a calculated thickness between 0.5 to 50  
35      microns.

However, nothing can be derived from said DE-OS 31 27 205

1 for the application of the protective layer. From the  
selection of the expression ("thickness of application")  
it can be concluded that by means of a spraying process  
or by means of roll coating the protective layer is  
5 attached to the backing already coated with adhesive.

This method is disadvantageous because a lot of working  
steps and waiting periods are needed; an equal and even  
coating is very difficult to apply.

10 Therefore it is the object of the invention to describe a  
method by which the film mentioned above may be produced  
under the conditions of low time consumption, of a high  
quality standard and of a minimum of process steps.

15 According to the invention this object is achieved by a  
method of manufacturing of the above mentioned multilayer  
plastic film in which the three layers, i. e. backing,  
adhesive coating and cover layer are coextruded in one  
step and wherein the layers have preferably the following  
20 thicknesses:

|                        |                                |
|------------------------|--------------------------------|
| backing                | from 20 microns to 100 microns |
| adhesive coating       | from 10 microns to 100 microns |
| 25 plastic cover layer | from 2 microns to 20 microns,  |

wherein the cover layer consists of a brittle extrudable  
thermoplast.

30 The coextrusion is preferably performed by means of a  
tubular film extruding machine with a multilayer tool,  
which is known by the expert. Said extruding machine  
allows the extrusion of several, especially three layers.  
In this process several supply channels for the flowable  
thermoplastic material are used. One of the channels con-  
35 ducts the melted plastic for the backing, the second con-  
ducts the adhesive and the third conducts the plastic  
which hardens to the brittle cover layer to the die mouth.

1 For the first and the third layer plastics may be used  
which cannot be pasted together but permit only to be  
connected by the adhesive.

5 The term, "backing", used in the present case, is to be  
understood to mean various extrudable thermoplastics as  
are known in themselves in the state of the art. In  
general they can be polyolefins or olefin copolymers of  
various mechanical and chemical properties. It is impor-  
10 tant that, in the use of the tool, the backing be not  
destroyed, i. e., that it be substantially more elastic  
than the brittle cover film.

15 It is to be expressly noted that the backing can serve  
only as part of a support layer, e. g., other materials  
being duplexed onto the side of the backing opposite the  
side of the adhesive coating, such as metal foils, addi-  
tional plastic films, paper and the like. In this case  
the multilayer plastic film of the invention should be  
20 understood only as an "intermediate product."

The term, "tool", refers to corrugated, pointed of edged  
means which produce a shearing or pressure stress and  
cause the protective film to break up or shatter. "Ob-  
25 jects" can also be involved, this term meaning especially  
the seat onto which the multilayer film is adhered. What  
we have in mind is, for example, flange-like edges of  
plastic cups which already bear such corrugation of  
waffling that the stress applied to the superimposed  
30 multilayer film breaks up the brittle protective film.

The brittle protective film or facing consists of a  
brittle extrudable thermoplastics, especially of a  
brittle polyethylene or polystyrene.

35 Suitable adhesive coatings are self-stick or pressure-  
sensitive adhesives or hot-melt adhesives such as are

1 known in themselves. Self-stick compositions or pressure-  
sensitive substances are elastic and permanently tacky  
compositions of great adhesive strengths and low cohesive  
5 strengths which immediately adhere under only slight  
pressure at room temperature to different surfaces. They  
are used, for example, for adhesive films and tapes,  
self-adhesive labels and the like. In general they are  
highly viscous solutions or dispersions of rubber, poly-  
acrylates, polyvinyl ethers or polyvinylisobutylene,  
10 which are applied to the backing. Examples of hot-melt  
adhesives are polyacrylates, ethylvinyl acetate polymers,  
or polyesters. The above-named adhesive compositions and  
hot-melt adhesives will be selected by the skilled prac-  
titioner of the art on the basis of their compatibility  
15 with the material of the backing and their coextrudabili-  
ty. Such adhesive compositions and pressure-sensitive  
adhesives can also be so adjusted that they permit the  
removal and reapplication of an article.

20 In the scope of the invention, multilayer sheet materials  
can be made using the plastic film. In this case the  
multilayer plastic film is adhered after coextrusion to  
paper, cardboard, metal foil or other flat materials by  
shattering and breaking up the cover layer by means of a  
25 tool or object so that the adhesive is exposed.

With the film produced according to the process openings  
can be sealed, e. g., the mouths of plastic cups and the  
like when such openings are surrounded by a flange-like  
margin. The multilayer plastic film produced by coextru-  
30 sion is laid onto and is pressed there by means of a tool  
so that the brittle plastic protective film is shattered  
against the margin and the adhesive emerges. By means of  
the adhesive an adhesive bond is produced between the  
margin of the opening and the backing. A similar margin  
35 seal can the be produced by a punching or cutting tool.

1 As stated in the beginning, the pressing and shattering  
of the cover layer can also be facilitated by providing  
the margin around the opening with a studded texture, or  
with knurling or other such textures which will destroy  
5 the protective film facing and yield a continuous ring of  
adhesive. If a film is used which is equipped with a hot-  
melt adhesive, it is heated during the pressing or after  
the film has been pressed. Appropriately equipped tools  
are used for this purpose, such as high-frequency  
10 electrodes.

It is also possible to produce a multilayer sheet mate-  
rial by making it to consist of two preferably equal  
plastic films laid one on the other at their brittle  
15 plastic facing, and bonded together after shattering the  
facing.

Embodiments of films and application examples of said  
films manufactured according to the invention are  
20 represented in the appended drawing, wherein:

Figure 1 is an enlarged representation of a cross section  
through part of a multilayer plastic film,

25 Figure 2 shows the application of the plastic film to  
seal the mouth of a container,

Figure 3 shows the production of a multilayer flat  
article from two plastic films according to the  
30 invention.

Figure 1 shows a coextruded plastic film having a backing  
1 of polyethylene that is about 50 microns thick, to  
which a pressure-sensitive adhesive composition has been  
applied as the adhesive coating 2. The outer face of the  
35 adhesive coating is covered with a brittle plastic facing  
3. The thicknesses of the layers are represented approxi-



1 mately in scale. The brittle plastic facing consists in  
the present case of a polyethylene.

5 By means of a tool 5, here represented only diagrammati-  
cally, and having a serrated bottom, the film is pressed  
against a paper strip 6 under which is a support to  
withstand the force of the tool 5. When the tool is  
pressed onto the plastic film, the facing 3 shatters and  
breaks up, as indicated in Figure 1. The adhesive in the  
10 adhesive coating 2 emerges from the shattered openings  
and thus makes the paper layer 6 adhere to the backing 1.

15 In Figure 2 another possible application is represented.  
Here the mouth 9 of a plastic cup, of polycarbonate for  
example, which is not fully shown, is being sealed. This  
is accomplished by laying the multilayer plastic film 10  
according to the invention, made by coextrusion, on the  
lip 9 of the cup. The adhesive layer 2 consists in this  
case of a hot-melt glue which is released by heating the  
20 adhesive with the tool 5' during or after the pressing on  
of the film. The tool is, for example, a high-frequency  
electrode. The brittle facing is shattered, as represen-  
ted by the broken lines, while simultaneously with the  
shattering the hot-melt glue in the adhesive coating 2 is  
25 heated and flows out of the shattered areas and cements  
the backing 1 to the lip. A cutter 11 then performs a  
clean trimming of the overhanging film.

30 In Figure 3 there is shown another possible use of the  
plastic film according to the invention in the production  
of a multilayer, flat material. Two identical plastic  
films 10 and 10' are laid one on the other with their  
brittle plastic facings together. By means of compatible  
tools 5 and 5' the films are pressed against one another,  
shattering the brittle facings 3 and 3' and exposing the  
35 adhesive or causing it to emerge in the shattered areas.  
This causes the two coextruded materials to adhere to-

1       gether to form a single, multilayer product. The two  
plastic films 10 and 10' can also be different, e. g.,  
the backings can be of different thicknesses or the  
adhesives can be of different composition. The adhesives  
5       present in layers 2 and 2' can be adhesives that are  
compatible with one another or they can be components  
which react with one another.

10       Different substrates such as paper, cardboard or additional plastic films, or even metal foils, or combinations of these materials, can be bonded to the film according to the invention.

15       The backing is preferably polyethylene, e. g., low-density or high-density polyethylene, or it can be a propylene copolymer. Here too the person skilled in the art will be familiar with additional possibilities of configuration, which are susceptible of many variations.

20       For examples of manufacturing of the films according to the invention the following methods of coextrusion are mentioned:

Example 1:

25       By means of an extruder a three layer coextruded film as a coextrudate is made of polyethylene (soft-adjusted) as inner layer and backing, a polyvinylisobutylene-adhesive as middle layer and a polystyrene (brittle-adjusted) as cover layer are coextruded, subsequently cooled and cut  
30       open.

Example 2:

35       By means of a tubular film blow extruder or cast film extruder equipped with a three-layer tool a polypropylene (soft-adjusted) as inner layer and posterior backing, a polyacrylate-adhesive as

1 adhesive layer and a polyethylene (brittle-adjusted) as  
cover layer are coextruded, subsequently cooled and cut  
open.

5 The mentioned examples can be modified for numerous  
suitable materials, wherein the manufacturing parameters,  
i. e. temperature, amount of fluid, pressure etc., have  
to be observed.

10 The films manufactured according to the method can also  
be used for manufacture of multilayer plane bodies. For  
this purpose, the multilayer plastic-films are pasted  
together with paper, paperboard, metal film, plastic  
films mono- or biaxial drawn or other plane materials.

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CLAIMS:

1. Method of manufacturing of a multilayer plastic film which has a backing and a coating applied thereto consisting of adhesive, which coating is externally coated with a cover layer which by means of a tool or object inducing pressure exposes the adhesive arranged underneath the cover layer,

characterized in

that the three layers, i.e., backing, adhesive coating and cover layer are coextruded in one step, wherein the layers have preferably the following thicknesses:

|         |                                 |
|---------|---------------------------------|
| backing | from 20 microns to 100 microns, |
|---------|---------------------------------|

|                  |                                 |
|------------------|---------------------------------|
| adhesive coating | from 10 microns to 100 microns, |
|------------------|---------------------------------|

|                     |                               |
|---------------------|-------------------------------|
| plastic cover layer | from 2 microns to 20 microns, |
|---------------------|-------------------------------|

and that the cover layer consists of a brittle extrudable thermoplast.

2. Method according to claim 1, characterized in that the brittle-adjusted thermoplast is a brittle-hardening polyethylene or polystyrene.

3. Method according to claim 1, characterized in that the adhesive layer consists of an adherent pressure sensitive composition or of a hot-melt adhesive.

4. Method according to claim 3, characterized in

that the pressure sensitive composition or the hot-melt adhesive is adjusted so that it permits removal and reattachment of an object.

5. Method of manufacturing of a multilayer plane body produced using the multilayer plastic film according to claim 1, characterized in that the multilayer plastic film is adhered to paper, cardboard, metal film, plastic film mono- or biaxial drawn or other plane material.

6. Method according to claim 5, characterized in that the drawn plastic films are metallized or are duplexed with metal film, especially aluminium film.

7. Method of manufacturing of a multilayer plane body produced using the multilayer plastic film according claim 1, characterized in that said body consists of two preferably identical plastic films laid onto one another at the brittle plastic cover layer which films are bonded together after shattering the cover layers.

8. Method according to claim 7, characterized in that the adhesive layers of the films that are used are two reacting components.